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SPECIAL FEATURES

ATLANTA-MIAMI AIR MAIL SUCCESSES
COMMERCIAL AVIATION IN THE NATIONAL DEFENSE
FLIERS' ASPECTS OF AEROGRAPHY

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under Act of March 3, 1879

The Byrd North Pole Plane arrives at Mitchel Field, L. I., completing the first leg of its United States tour

(c) Wide World Photos

(c) Wide World Photos

Floyd Bennett, who flew over the North Pole with Byrd and who pilots the plane on its United States tour

Byrd North Pole plane tour

To promote interest in commercial aviation

THE daring flight of Commander Richard E. Byrd and Pilot Floyd Bennett from Spitzbergen to the North Pole and return was an achievement of note in the history of air travel and exploration.

The celebrated North Pole Plane is now making a tour of the United States, and is scheduled to visit some forty cities between the Atlantic and Pacific. This flight is sponsored by the Daniel Guggenheim Fund for the Promotion of Aeronautics and has for its objectives furthering the use and development of commercial aviation and air mail, and stimulating the building of air ports by towns and municipalities throughout the country.

Mr. Bennett's experience with the excellent performance of Gargoyle Mobiloil "B" in the Wright Whirlwind Engines on the Polar Flight, prompted him to see to it personally that Mobiloil would be used throughout his present tour.

Correct lubrication of aircraft is of vital importance, and careful pilots everywhere generally choose to use Mobiloil. The absolute uniformity and ready availability of Mobiloil relieves the pilot of all anxiety regarding lubrication.

Whether the flight is around the United States or around the world, Mobiloil is near at hand whenever it is wanted.

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AVIATION

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VOL. XXI NOVEMBER 15, 1926 No. 20

Last Minute Thoughts on the Schneider Cup

BY THE time this issue of AVIATION appears, the international race for the Jacques Schneider Cup will have taken place and either Italy or the United States will hold the seaplane speed honors for 1926, in this great contest. Few details are available at this time regarding the Italian Macchi monoplane racers but, from photographs of the machines, some of which are published elsewhere in this issue of AVIATION, there is absolutely no doubt that they reflect extreme credit upon the Macchi and Fiat companies, which, respectively, produced both planes and engines, and upon Italian aeronautical development in general.

While little is as yet known regarding the three Italian Macchi monoplanes, there are some points regarding the American machines which are of interest. In the first place, the three Curtiss Racers are almost identical, with the exception of engines. Of the two higher powered machines, one is fitted with a Packard engine and the other with a Curtiss engine, each developing 700 hp. The former is geared, while the latter is a direct drive engine. It has been customary to use only direct drive engines in air racing, the high propeller speeds at low pitch being considered superior to lower rotational speeds at higher pitch.

What the direct drive engine may gain in one direction the geared engine may make up for in another. For example, the streamlining of the cylinder banks of the engine in a racing plane has always been a complicated problem over which a compromise has to be made. It will be observed, in the case of the Packard engined plane, that the gearing of the propeller shaft brings the hub higher up which has enabled the complete enclosure of the cylinder banks in a perfectly symmetrical streamline cowling. Obviously the fuselage of this machine will have a lower drag than that of the Curtiss engined plane. But the latter may gain on the direct-drive of the engine.

Piloting skill must play an important part in the race. Two of the corners of the triangular course are exceedingly sharp, far more so than were the turning points in last year's race course. Taking sharp corners in these high speed airplanes demands exceptional skill and it may even develop that the slower machines will have a marked advantage over the fastest on this account. Piloting has always proved a very vital question in high speed air races.

Meteorology and Aviation

TOO MUCH stress cannot be placed upon the importance of a knowledge of meteorology to the successful operations of an air transportation line. There is, in fact, only one class of transport service which is more or less immune from weather conditions and that class includes, of course, the various and numerous forms of land travel. On the water or in the air, however, the conditions are entirely different and the state of the weather will always have a marked bearing upon such transport services.

It has long been one of the most important requirements of a ship's master, that he be throughly acquainted with at least the rudimentary facts concerning weather problems. Right down to the smallest ships at sea, this fact holds and it is a point of even more importance in the case of air navigation. It does not appear that the degree of understanding of the conditions of aerography by airline pilots and navigators is only to be gained after a long and extensive study. It would appear rather that the requirements call for but a reasonable study of the science of aerography together with the accumulated knowledge gained from the continual experiences of regular air operations.

The Light Plane for the Flying Public

SOME YEARS ago AVIATION started a lightplane department which was run for some time with a view of encouraging lightplane development. Since then, many lightplanes of excellent design have been built and have made many fine flights. AVIATION is still interested and still believes in the possibilities of these little machines. However, if the truth is to be adhered to, it must be admitted that lightplanes to date have not sold in the large quantities which were expected. In a recent editorial, this fact was pointed out, not in a spirit of criticism of the really splendid performances of some of the lightplanes, but rather with the idea of suggesting a possible reason why these splendid performances did not result in sales.

The editorial brought us letters from many parts of the United States and even from abroad, drawing our attention to many fine flights which had been made in lightplanes. The letters really reinforced the argument which the editorial put forth, that, in spite of fine performance, the public had not as yet taken to the lightplane. In searching for the solution of the problem, the idea occurred that the major effort which had been put into lightplane development had gone into producing a plane which was to be flown by professional pilots in races and competitions and that, as a result, the designers had, to a considerable extent, lost sight of the fact that the future of the lightplane lies with the non-professional flier. Insufficient effort and thought has perhaps been put into making the lightplane easy to fly. From watching lightplanes fly in races and from talking with the pilots the public has gained the idea that lightplanes are tricky and difficult to handle. While this is undoubtedly not always the case, it is this feeling which must be overcome if the lightplane is to become popular. The low-powered economical plane has a great future but it will not come into its own until it can be flown with ease and safety by inexperienced pilots.

Commercial Aviation in the National Defense

The Armament Used on Military Aircraft

By MAJOR W. L. CLAY, Ord. Dept

THE CONTROVERSY over and investigation of our aerial situation is still fresh in the minds of the public. The President's Aircraft Board and Congress have laid down the lines of development for the future and, to use the words of our new Assistant Secretary of War Davison, "Military Aviation in America is on the threshold of a new era." This new era should bring forth great progress in military aviation as well as the rapid development of commercial aviation to a degree at least equal to that of foreign nations.

America, the pioneer nation in flying, is awake to the great possibilities of this mode of conveyance in commercial life and is beginning to realize the great potential value of organized civilian aerial forces to the military aviation of the country. The industry of the country plays a fundamental part not only in the development of our planes for commercial use, but also as the basis upon which to build our sources of supply in case of emergency. The design of airplanes for commercial purposes must naturally follow along lines giving the best results for the purpose intended, but in every case where types are similar to those of the military service consideration should be given to the adaptation of military equipment to the planes in case of emergency. The personnel and fighting equipment of our aerial forces surpass that of most nations. Considering our vast financial resources and our inherent initiative along progressive lines, there is no real reason why this country should lag in the development of its commercial aviation. The Department of Commerce is making every effort to assist commercial aviation and the Air Corps is prepared to render technical aid as soon as commercial firms are ready to embark into this field of development.

The responsibilities of the recently created Air Corps are well defined in connection with the development, supply, and maintenance of aircraft. However, the Ordnance Department of the Army bears a share of the burden as it is responsible for a major part of the armament or fighting equipment necessary for military planes.

Activities of Ordnance Dept.

The Chief of Ordnance has long since appreciated the great possibilities of aircraft and has personally followed the development and production of the various items of Ordnance required for fighting planes. Up until July 1, 1921, a branch office was maintained by the Ordnance Department at McCook Field the experimental and engineering station of the Air Corps, in order that the closest liaison might be maintained with the Air Corps in the development of equipment to meet its needs. Up to that time the Ordnance Department had been responsible for the development and production of bomb racks for carrying aerial bombs and such close liaison was necessary as many of these racks are built into the fuselages of the larger planes. As development progressed it was considered inadvisable to have one Department of the Army responsible for a fixed built-in unit of an airplane for which another Department was primarily responsible. Accordingly, the bomb racks were turned over to the Air Corps and are now its responsibility. The Ordnance Department still maintains sufficient liaison with the Air Corps at McCook Field to keep other features of aircraft armament in proper alignment.

Let us now consider the primary weapons of offense and defense as used by modern fighting aircraft and their relative functions on the airplane.

During the War, great strides were made in aerial warfare and the airplane changed from a means of rapidly carrying orders and obtaining information of the enemy from the air, to one of the prime units of the fighting forces. The great possibilities of the machine gun mounted on airplanes were soon realized and many means of mounting them were developed. At first they were tried on top of the wings over the pilot, out on the wings, and in various other positions until finally in certain cases they were synchronized to fire through the revolving propeller blades.

It has been found that, to the pilot, the machine guns, their operating parts and ammunition, form a clearly defined unit to which the other parts of the airplane should be adapted,

Fig. 1. Test Browning Machine Gun Model 1918, of modified type

and around which they should be grouped. This should be borne in mind when types of aircraft for commercial purposes are being developed.

Machine guns for aircraft are divided into two classes, fixed and flexible. The fixed guns are generally mounted in pairs to fire through the propeller or from the wings, while the flexible guns are mounted singly or in pairs for use by an observer. Fixed guns only are used in single-seater fighting planes and the standard type of fixed gun for our service is the Browning.

It will be evident that the following conditions must be met for fixed guns in the design of airplanes:

(1) Satisfactory feeding of the machine guns.
(2) Means of ejection of fired cartridge cases.
(3) Satisfactory vision for the pilot and means for his using the sights with the guns.
(4) Accessibility of the principal parts of the installation and means of rapidly mounting or dismounting the machine guns if necessary.
(5) Proper provision for the ammunition.
(6) The pilot's convenience and safety in case of a crash or mishap in the air.

Designers of aircraft can obtain detailed information from the Air Corps on all points covered above.

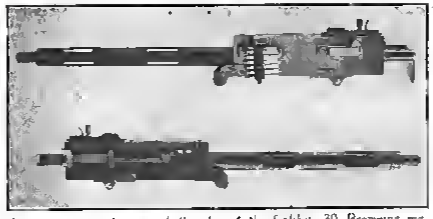
Fixed guns of the Browning type are shown in place on Fig. 1.

The Browning aircraft machine gun is chambered for the standard caliber .30 M1 U. S. ammunition. It is strictly an aircraft gun and, therefore, has no special cooling system provided. It is recoil operated and capable of firing at an average rate of 1200 shots per minute. The gun is fed by means of disintegrating metallic link belts.

Weight of gun complete	24 lb. 6 oz.
Weight of bullet	172 gr.
Weight of powder charge	47.50 gr.
Weight of cartridge	416 gr.
Length of barrel	24 in.
Caliber of bore	.30 in.
Chamber of pressure (lb. per sq. in.)	50,000 mean
Muzzle of velocity (ft. per sec.)	2700

Figs. 2 and 3 show views of the Browning aircraft machine gun.

The machine guns having been mounted to fulfill the conditions given above are now ready for attachment to the device required for synchronized fire through the propeller blades. The Nelson gun control is at present used by our Air Corps. The accompanying diagram shows the arrangement of the control system for regulating fire. The trigger motor is mounted on the side of the machine gun. As the aviator pulls on the operating handle, which is attached by a bracket to his airplane control, the pull is transmitted by means of a bowden wire to the generator unit and as the plunger is pulled down the cam is allowed to come into action and produce a pull on the impulse cable by pushing the tappet against the rocking lever. (See Fig. 4.)



Figs. 2 and 3. Showing both sides of the Caliber .30 Browning machine gun, Model 1918 M. T.

There are two impulses per revolution and as these are transmitted to the trigger motor they allow the machine gun to fire by releasing the gear. The machine gun is still under control and after it has been fired and the time necessary to complete the cycle of the mechanism of the gun has passed, it is again ready to fire but cannot do so until its sear is released through another impulse to the trigger motor. When synchronized the gun ceases to operate at its full automatic rate but fires at a varying rate depending upon the number of impulses communicated by the fire control apparatus to the sear of the gun.

Synchronization

Just as the timing gears of an automobile control the firing of the various cylinders, so is it necessary to time the Nelson control so that the machine gun will fire between the propeller blades. This is done by adjusting the apparatus so that the zero points are those points just opposite the bore of the gun as the tappet rides up on the hump of the cam. At this same time the trigger or sear is released. A check of the dispersion of the shots is obtained by placing a disc in the plane of the rotation of the propeller and fastening it securely to the propeller shaft. The gun is then fired with the disc stationary to obtain the first zero point after which the disc is revolved through 180 degrees and the gun fires again to obtain the second zero point. The engine is then started and the disc revolved at the various rates of speed ordinarily used in the air and firings conducted by manipulation of the operating handle.

It will be noted that the shots group in various places as the speed changes and that the group at 2000 r.p.m. is considerably behind the group at 500 r.p.m. This is due, of course, to the time which elapses during the firing of the cartridge and while the bullet is traveling from its seat in the bore of the gun to the disc. This time will be practically constant for a given distance of gun from the plane of the disc and, therefore, the faster the disc revolves the farther it will have turned before the bullets hit it. The apparatus shown in Fig. 5 is used for testing all aircraft ammunition on the revolving disc before it is issued by the Ordnance Department to the Air Corps. A hangfire or delayed action of any one cartridge will show as a stray shot out of its group on the disc.

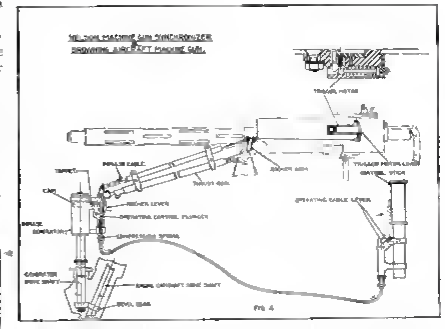


Fig. 4. A diagrammatic view of the Nelson Machine Gun Synchronizer

It is an axiom of the Air Corps and the Ordnance Department never to send a gun up in a plane when there is the slightest doubt of its functioning properly. The importance of the proper care of machine guns mounted in airplanes is fully realized as the guns are working under adverse conditions and a stoppage may prove fatal to the operator or at least cause him to fail in his mission.

In order to prevent the oil gumming due to low temperature when flying at high altitudes, an electric heater has been devised for aircraft machine guns. It is fed from the airplane generator and consumes on the average of 60 watts at 12 volts.

The empty shells are ejected through the bottom, and the links from the side of the gun. Before firing at the fixed targets or, in time of war, before entering the air for combat, the aviator must have his sights properly aligned with his machine guns. A plumb line is dropped from the center of the propeller shaft and also a plumb line from the center of the tail. A target 8 ft. in diameter is placed 200 yards from the plane. Sighting is taken over the two plumb lines into the center of the target, thus lining the plane to the target. Under the tail of the plane is placed an adjustable horse and a spirit level is placed in the fuselage on one of the longerons. The tail of the plane is raised or lowered until level by adjusting the height of the horse.

Lining Up Guns

The guns are now sighted directly into the target, both guns being converged so that they are sighted at the same point without moving the plane. The guns are sighted through the bores by use of a bored deflector which is an off set mir-

Fig. 5. Ammunition testing apparatus

ror device so arranged that one can look through the barrel of the gun without being directly in rear of it. The sights are then placed in their brackets and adjusted until they sight 8 in below the dead center of the target, the adjustment of sights being made by the thumb screws on the rear brackets. The gun is sighted directly on the target because aerial fighting generally takes place at ranges within 200 yards. Thus, the probability of hitting the target outside or inside of 200 yards is increased, whereas if the guns were sighted to aim at 100 yards the probability of hitting the target at 200 yards or more would be greatly decreased. The reason for sighting 8 in. below the dead center of the bull's-eye is to insure accuracy at the shorter ranges.

This is only one of the methods that can be used for adjusting sights as many have their own ideas as to the ways of adjusting their guns and sights depending upon their peculiar mode of conducting aerial combat.

In addition to the caliber .30 machine gun, a larger type has been developed known as the Caliber .50 Aircraft Machine Gun. It fires a bullet weighing 805 grains at a muzzle velocity of about 2500 ft per sec. Its muzzle energy is about four times that of the caliber .30 machine gun. It is air-cooled, weighs about 50 lb, fires at the rate of 400 to 700 shots per minute, is fed by metallic links, and has a barrel 36 in. long. It fires semi-automatically when attached to the mechanical synchronizing gears and full automatic when fired by hand.

Besides being made of larger parts than the caliber .30 gun, it has a hydraulic buffer for checking recoil and is adapted for mounting the trigger motor on either side. It has the advantage of greater striking energy (it will pierce 1⅛ in. armor) and larger capacity for tracer and incendiary material in the projectile with longer range. It has the disadvantage of greater weight and greater space required for its mounting. Each round of ammunition weighs about ¼ lb. No electric heater is needed for use with this gun at high altitude on account of its positive action.

(To be Continued)

Argentina Fight Locusts from Airplanes

Argentina has begun an experiment of fighting a plague of locusts by the use of chemicals and gases spread from airplanes, according to the Department of Commerce. Modern chemical insecticides, gases which produce smoke curtains, and even gas bombs developed by Spain in the Moroccan War are being employed. As yet only one plane is in use, but if successful the number of planes in service will probably be increased.

Uniform Air Mail Rate Proposed

An effort to establish a universal flat rate of postage for the transportation of air mail to replace the cumbersome, involved and conflicting air mail structure now in use is being made by postal officials and experts, Harry S. New, Postmaster General, has announced.

It is hoped that a decision on this matter will be reached shortly. Indications are that the rate will be fixed at 10 cents per half ounce or fraction thereof. Such a basis would materially reduce charges on long hauls but would increase rates somewhat on short-haul letters or packages weighing more than half an ounce.

At the same time, however, such a rate would obviate charges for governmental subsidies to air mail contractors, since the Post Office Department would receive $3.20 per pound of air mail, while paying contractors only $3 per pound, which is the maximum fixed by law.

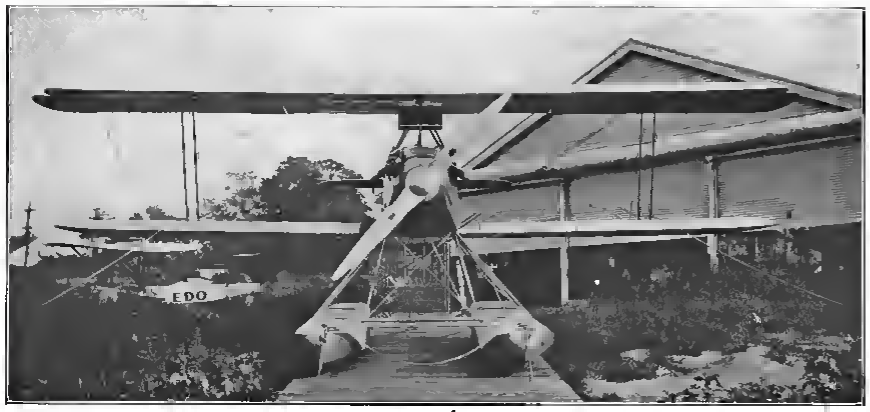
A rate of 10 cents per half ounce would not increase the rate for the average business letter, which seldom runs beyond two pages of medium heavy paper inclosed in long envelopes. Three such pages in short envelopes would be mailable under the half-ounce basis. It also is believed that few social letters run beyond half an ounce.

While such a rate would obviously reduce the number of packages offered for transportation by air mail it is believed the proposed rate would attract a large amount of business and social correspondence and perhaps some advertising matter.

German Government Acquires Udet Works

Another large airplane construction company, the Udet Works in Munich, Bavaria, Germany is said to have been taken over by the German Federal Government. Last Spring the Udet plant amalgamated with the Rumpler Works in Augsburg, Bavaria, under the name of the "Bayerische Flugzeugwerke, A.G." In January last the Junkers and the Aero Lloyd Air transport companies were amalgamated, the federal government acquired an interest in this company.

Connected with the Rumpler section of the new company is Dr. Rumpler, who has been creating considerable talk in Germany lately by virtue of his model "plane of the future". This model portrays a giant ten-engine three tandem wing plane, with accommodations for 100 passengers. The plane is intended for trans-Atlantic travel. The model is being shown in movie theaters all over Berlin. Actual construction and equipment are expected to drag out over a long period of time.



A standard Waco-9 equipped with Edo duralumin pontoons.

Some Last Minute Schneider Cup News

Observers, Judges and Timers Named

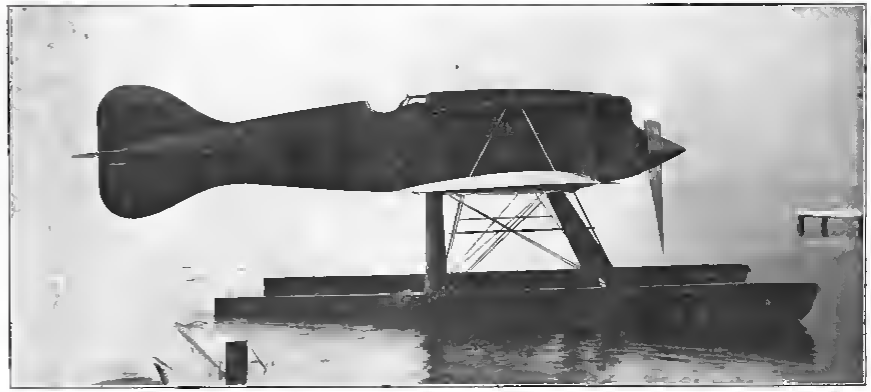
BY THE time these notes appear in print, the international seaplane race between Italy and the United States for the Jacques Schneider Cup will have been held at Norfolk, Va., and the guardian of the Trophy for the coming year decided, with the possibility of the United States winning permanent possession. There are, however, some last minute items of interest which it has not been possible to record before.

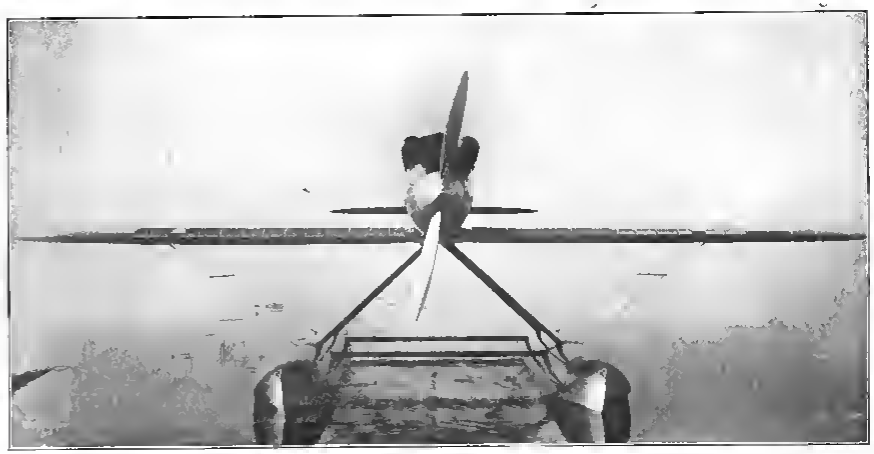
Carl F. Schory, secretary of the Contest Committee of the N.A.A. has been in Norfolk for some days before the contest on Nov 11, arranging details. Capt C. Earle Townsend of Norfolk, a former Army flier, was named Chief Scorer and Thomas Carroll, of the Langley Memorial Aeronautical Laboratory, chief of the Judges. The timing was to be under the direction of Otis Porter, well-known as timer for the National Air Races.

The Timing and Observation Committee

Last week, we announced that Capt. C. Earle Townsend was named chairman of the Timing and Observation Committee, but the names of the membership of the committee were not then available. It is now possible to publish the complete membership of this committee as follows: Captain Townsend, chairman; Major William E. Coleman; Capt. J. Barbour Rixey; Capt. J. A. Wright; Capt. J. S. Jackson. Capt. W. G. Robertson; George L. Bonney, J. R. Lassiter; J. Winfield Brownley; Charles C. Cheshire; and George Lorkin. The judges and timers for the National Aeronautic Association

(Continued on page 885)





Two views of the Macchi 39 racing seaplane, three of which were to represent Italy in the Schneider Cup race. The engine is a Fiat, 700 800 hp. As will be seen, engine cooling is provided for in the main by wing radiators.

Huff Daland Airplanes Expands

Edgar N. Gott Becomes President of Company with Increased Capitalization.

AT A special meeting of the stockholders of the Huff Daland Airplanes, Inc, held at the executive offices at 25 Broad Street, New York, new capital was authorized, bringing the total capitalization of this airplane company to over one million dollars. The new capital authorized is four thousand shares of preferred stock and four thousand shares of common, with no par value. The total amount of the new stock issue was over-subscribed at the meeting In making the foregoing announcement, Thomas H Huff, president of the company, added, "It is decidedly pleasant to note the increased general interest in the aircraft industry The tendency to increase the activities of our company in the development of commercial aircraft reflects the new era in aviation"

Edgar N Gott president and general manager Huff Daland Airplanes, Inc.

New President

During the special meeting the stockholders of the Huff Daland Company elected the board of directors for the ensuing year Thomas H Huff announced his retirement as president of the company and Edgar N Gott recently vice-president of the Fokker Aircraft Company of New Jersey, was elected as President and General Manager Prior to joining the Fokker Company, Mr Gott was president of the Boeing Airplane Company of Seattle, Washington He is particularly well-known in the aviation circles on the Pacific Coast, in Washington, D C, and throughout the East

"We expect soon to branch out extensively in the field of commercial aviation both in the United States, Canada, and South America", said Mr Gott "At the present time we have twenty cotton dusting planes operating throughout the Southern States, combatting the boll weevil menace, and we expect shortly to undertake an even broader scale of operations which will take in Pacific Coast flying and dusting calcium arsenate on insect pests in Peru"

The Huff Daland plant in Bristol, Pa, is one of the largest airplane plants in the United States, and, during the past year, the company has turned out a number of Pegasus light bombardment planes for the Army Air Service. These planes are the fastest bombers of their size in the World and for the past two years have captured the World speed records for their class. The Huff Daland Co has also constructed the Cyclops, the World's largest single engined bomber

An Ardent Supporter of Aviation

Edgar Nathaniel Gott, the newly elected president of Huff Daland Airplanes, Inc, has long been closely associated with aeronautical activity Born in Detroit, Mich., May 2, 1887, he was educated at Detroit University School, and the University of Michigan, where, in 1909, he graduated, B S

After graduation he became associated with the Griffin Wheel Co., of Pullman, Ill, in the capacity of assistant superintendent later becoming resident engineer at this company's plant in Tacoma, Wash He remained with the Griffin Wheel Co until 1915, when he resigned to become vice-president and general manager of the Boeing Airplane Co, Seattle, Wash., of which concern he was made president in 1922. Upon leaving the Boeing Airplane Co, he joined the Fokker Aircraft Corporation, as vice-president.

Mr Gott has been identified with aviation for many years both in the East and on the Pacific Coast. He is a member of the Aero Club of the Northwest

German Air Line Wants More Freight

A campaign to increase the amount of freight carried by airplanes is to be undertaken by the Luft Hansa, the German air transport company Traffic in passengers and postal matter is said to be satisfactory but freight traffic apparently fails to keep pace with the other types of carriage

From April to August of the present year, the Luft Hansa states that its planes carried the equivalent of 50 train loads of passengers and 50 carloads of freight The difference between these two is regarded by the company as too large and efforts are to be made to convince shippers of the desirable features of air transportation.

The Luft Hansa, it is said, plans to continue its services throughout the coming Winter, a departure from the previous practice of its constituents Last year and in previous years the services were discontinued in December and resumed in April The Winter schedule will, of necessity, be more restricted than that of the Summer

Air freight rates in Germany now are said to cost about four times as much as railroad freight rates The transportation by air of a kilogram of goods shipped from Berlin to London costs about 1 mark, while a similar amount shipped by rail and steamer costs only about 25 pfennigs The latter figure, however, applies only to ordinary, slow freight There are forms of express shipment, which guarantee delivery in London within 36 hr. after shipment from Berlin and the rates charged for these services are almost as high as those charged for air freight.

Flags for Airliners

According to recent reports, British air liners are to fly an ensign which will be specially designed as the flag of Britain's air fleet Experiments are being carried out on Imperial Airways planes with flags of various materials. They are fastened to the struts between the wings of the machines

Schneider Cup News

(Continued from p 837)

were all chosen from the staff of the Langley Memorial Laboratory as follows Thomas Carroll, chairman, John W. Crowley, Jr; Richard V Rhode, Otto E Kirschner, Smith J. DeFrance, George J Higgins, Andrew J. Fairbanks; Elliott G Reid, Warsden Ware, and Arthur W Gardiner.

One interesting feature of the Schneider Cup race is that it is now the only international air contest of the year. The Gordon Bennett Cup was the first international classic and this was won permanently by France after three successive victories. Following this, the Deutsch Cup, presented by the late Henri Deutsch de la Meurthe, was also won by France after two successive contests. The French also captured permanent possession of the Beaumont Cup, presented by an American, Commodore Beaumont. The Jacques Schneider Cup, as stated last week, was presented to the Aero Club of France by M Jacques Schneider in 1913. It is a magnificent trophy of gold, silver and bronze.

The Fliers' Aspects of Aerography

*The Water Vapor in Free Air**

By ALEXANDER McADIE
Director Blue Hill Observatory, Harvard University

PEOPLE HAVE always talked about the weather, and in all likelihood fliers will continue to add their share to the general discussion, for weather means even more to those who traverse the air than it does to the man on the street And what do we mean by Weather? Winds, clouds, rain and snow Notice that three of the four items are simply different manifestations of water vapor in the free air If we can forecast accurately what the water vapor will do, we will be successful weather forecasters Weather, then, is essentially variation in the amount and distribution of water vapor And, throughout the gamut from low dense earth-bound fog to the highest cirrus cloud floating at the top of our troposphere, water vapor is of the utmost importance to the airman

Five hundred years ago, there lived an old professor in the city of Berne who loved the Alps so much that he denounced all men who would not willingly climb and explore the mountains, as stupid dull fish and slow tortoises. The winds of five centuries have dried Marti's dust and perhaps blown some of it higher than Mt Blanc but what would the old fellow say to one who told him that modern sons and daughters of Daedalus can hop over the Alps in an afternoon and look down on the glistening snow fields and crevasse-scarred glaciers?

The snow fields and glaciers of high mountain ranges, like the clouds, were once water in vaporous form, tossed upward by air streams, then condensed and solidified by the low temperature Water vapor is present in the air, either in invisible form or in the form of clouds, or as a liquid in the form of rain and dew, or, lastly in the solid form of ice, snow, frost and hail

Rain Winds

What is known as a rain-bearing wind is only an air stream dragging with it, by virtue of its momentum, a mass of water vapor There is no chemical union. The vapor preserves its own individuality and may be regarded as a traveling companion for the most part incog When an air stream rises or falls, or passes over a cold surface, or impinges on another air stream, originating elsewhere and having different temperature, density and pressure, or if it radiates its own heat too rapidly, then, because of the cooling which follows, the vapor becomes visible, even as one's breath does on a frosty morning

The particular form of water vapor most troublesome to the flier is fog There are several kinds but the two which interfere most with safety are fog in the free air (lifted fog) in which a pilot loses his way, and ground radiation fog which covers flying fields, preventing taking off and, more dangerous yet, obscuring the terrain in the vicinity, thus making landing neither safe nor sure Formerly, aerographers defined fog as cloud resting on the earth and, conversely, clouds were raised fogs This is true in general, but Dr Simpson, head of the British Meteorological Office, quite recently made a distinction between the two, in the way they are formed. Fogs form without any ascent of the air while clouds are never formed without it. On the other hand, all of us have seen valley fogs rise after sunrise and become clouds Incidentally, it may be mentioned that a pilot will experience a sudden warming-up as he flies out of a fog bank, because of the radiation of heat from the top of the fog bank. Something of the same nature happens with cumulus clouds

Fog Classifications

For the purposes of flying, fogs may be classified as ground radiation fogs and advective fogs The former are caused by loss of ground heat during clear, still nights, and the consequent cooling of air and vapor just above The other fog is brought in, already formed, and moving with the air, or forming whenever a warm stream interpenetrates an air mass of sufficiently low temperature The fogs that are seen in valleys in the early morning, represent the former type, while the sea fogs are, for the most part, advective

The chief disadvantage of fog is obscuration or decrease of visibility There is this difference between haze and fog, the former is essentially dustiness of air, that is, the obscuring particles are dry and the water content small Fog, on the other hand, is mostly water condensed on dust or other nuclei The total weight of water in a mist is about 0 25 gram per cubic meter, a very small amount when it is remembered that a cubic meter of dry air at pressure 1000kb and temperature 1000 Kk (freezing) weighs 1272 grams The water vapor in a fog under similar conditions, at 100% saturation would weigh nearly 5 grams.

The actual number of dust particles in a fog will vary, naturally with the direction of wind and the supply at the source As many as 50,000 per cubic centimeter have been counted, while, on fine days, the number falls below 1000

There are several instruments which should be in use at all flying fields, for the time is not far distant when a director of a flying field will be expected to forecast the duration of a fog spell, and increase or decrease of visibility Dr. John Aitken's dust counter and Dr J S Owen's dust counter may be mentioned, used in conjunction with a standardized whirled phychrometer

Visibility and Dust

The relation between dustiness and visibility is given by Kimball and Hand, based on measurements made at Washington, D C with an Owens' jet counter as follows, for surface conditions

(D) Limit of visibility in miles	Dustiness (C)
75	262,500
50	408 200
30	128 150
20	484 500
10	855 700
5	283 900
3	246 300

The equation is, C=N x R H. x D, in which N is the number of dust particles per cubic centimeter, R.H., the relative humidity or percentage of saturation, and D, the limit of visibility

There would seem to be several kinds of nuclei not acting alike as centers of condensation They may be present and no condensation result, but, in general, they act as condensing surfaces for vapor even in unsaturated air.

Dust particles vary from fine sand 01 cm. in diameter to smoke particles which in fine, diluted smoke may be about 000,001 cm in diameter There is no definite rate of settlement of dust particles because the air is never still The dust zone does not extend very high As a rule fliers can get out

*For those not familiar with scientific units and symbols the following conversion values will be convenient A meter is 39 37 in., or 3 28 ft. A foot is practically 3/10 of a meter A millimeter (mm) is the thousandth part of a meter Roughly, it is 1/25 in A line of type in AVIATION is about 80 mm long and 2 mm high A micron (μ) is 1/1000 of a millimeter We use it in measuring dust and very small particles

In spectroscopic work, still smaller units are used the mμ (millimicron) which is a millionth of a millimeter The Angstrom is a ten-millionth of a millimeter Physicists write it cm^{-8} meaning 000 000 01 centimeter A gram (g) is about 15 grains (gr) A kilogram 1000 grams, is 2 2 lb Remember also that 1 meter per second is about 2 2 m p h A kilometer is 62 mile. A mile is 1 6 kilometers One mile an hour is 0 4 meters per second 1 5 ft. per sec is 1 6 km per hr One foot-pound is 138 [illegible] gram centimeters One horsepower is 550 ft lb per sec., or 746 watts A kilowatt is about 1⅓ hp Atmospheric pressure is now recorded in units of force The megadyne (one million dynes) or megabar atmosphere is the barometer reading 29 531 in or 750 1 millimeters, at freezing and in latitude 45 deg The force of gravity or weight of one gram is 980 [illegible] dynes To convert kilobars (kbs) or (mbs) into inches multiply by 0 03 To convert kilobars (kbs) or (mbs) into millimeters multiply by 0 75 To convert inches into kilobars (kbs) or (mbs) multiply by 33.86

of haze at a height of 1000 meters. Fog and cloud, however, extend much higher, and may reach 10,000 meters. Here, however, we are dealing with ice particles; and the pilot must watch conditions closely, for an ice coated plane or airship is to be avoided.

The polar airship Norge probably travelled, even at moderate heights, in an ice-storm. That is, the air was stratified. An upper warm current containing much vapor was under run by a current of cold air, causing rain and snow. In a short time, the load might have become so heavy that the ship would be forced down. Ice-storms are not infrequent in our latitudes. Especially in November, pilots should watch and vary altitude in flight. Nearly 200 ice-storms have been studied at Blue Hill by Dr. C. F. Brooks and details may be found in his work, "Principles of Aerography".

The Dissipation of Fog

We now come to the question of possible dissipation of fog. Recent experiments by Worren, Bancroft and Air Corps fliers in cooperation with the Department of Agriculture engaged in spraying cotton fields, have demonstrated the feasibility of clearing dusty atmospheres.

The elder Rayleigh made many experiments on the coalescence of drops and spray when strongly electrified. Dr. Oliver Lodge has recently published his lecture on Electrical Precipitation, delivered before the Institute of Physics. There is little doubt that in the free air frequently drops unite because of electrical attractions and it is probable that such coalescence might be accelerated by artificial means. Lodge has said: "There are difficulties about the electrical controlling of the atmosphere. Is that to be the one region of the earth over which man has no power and about which he must succumb supinely to fate? I do not believe that it is." [Professor McAdie proposes to discuss this all important subject takes in an article on Lightening—Editor.]

Book Review

AIRCRAFT POWER PLANTS. By E. T. Jones, M.E., R. Insley, M.E., F. W. Caldwell, B.S., and X. F. Kohr, M.E. Published by The Ronald Press Company, New York, 208 pages. Price $4.25

This book might be termed a secondary training book. The reader is supposed to know the fundamental mechanical principals which underly the workings of the internal combustion engine and the book, in simple and easily understandable language, goes on to outline the principles and laws which govern the production and application of power in aircraft. Although there are many pages devoted to practical knowledge, the book is written not so much for the field mechanic and maintenance man as for the man who wishes to have a broader view of the aeronautical power plant problem. The book might also be termed an introduction in simple language for those who wish to go thoroughly into the development of power plant engineering.

The first part, written by Edward T. Jones, chief power plant engineer for the Wright Aeronautical Corp., deals with the theories underlying conversion of heat into mechanical energy. Various types, such as reciprocating and turbine steam engines, two- and four-cycle explosion engines, oil and gas engines, etc., are discussed and their advantages and limitations noted. The effects of compression ratio, types of fuel and thermal efficiency at varying loads are discussed and illustrated by simple graphs. Descriptions of various typical American aircraft engines are given with photographs of each.

The chapters on accessories, fuel and lubrication, and auxiliary systems are written by Robert Insley, of the Power Plant Section of the U.S. Air Corps. This part is more specific, as much of the information can be used directly in actual practice and in the diagnosing of underlying troubles.

Part II of the book deals with propellers. This subject is one of the most highly technical aspects of aeronautics as far as pure mathematical theory is concerned, but Frank W. Caldwell, of the Propeller Section, Engineering Division, puts the matter in such a light that much of it can be understood by the amateur engineer. After dealing with the theory, Mr. Caldwell goes on with propeller design and stress analysis and concludes with a chapter on propeller materials and construction.

Part III of the book is written by Robert F. Kohr, of the Bureau of Aeronautics, U.S. Navy. It deals with water ballast recovery and, though this subject is largely limited to the lighter-than-air class, there has been so little authoritative data written on the subject that this part of the book is of considerable value.

Airway Lights by Christmas

Approximately twelve hundred miles of airways have been surveyed by the flying superintendents of the Aeronautics Branch of the U. S. Department of Commerce.

At intervals of ten miles along these routes, leases have been signed for the use by the Department of Commerce for placing night flying lights. At every 30 mile interval, intermediate landing fields have been leased by the Government. These surveyed twelve hundred miles represent portions of the contracted air mail routes which are required by present schedules to be flown in the dark hours of late evenings and early mornings. Eventually, the unlighted areas of the airways will be equipped and night flying will be possible over the entire distance.

Following are the routes on which lighting is being installed, together with the approximate number of miles lighted:

New York to Boston, 185 miles; St. Louis to Chicago, 277 miles; Dallas to Chicago, 845 miles; Los Angeles to Salt Lake City, 140 miles; Paseo to Elko, 100 miles; Twin City to Chicago, 80 miles and Cheyenne to Pueblo, 160 miles.

Assistant Secretary MacCracken, also stated that deliveries are about to begin on the contracts let for the lights, towers, wind indicators, generating sets and other material, and that contracts have been let for the concrete construction of the marker arrows, the erection of the towers and power houses, and the complete installation of intermediate landing field lights and equipment in general.

It is expected that the current will be turned on a substantial mileage of the airways by Christmas of this year.

The Egypt-India Air Service

According to plans, the proposed British Egypt to India air service will be inaugurated on Jan. 1, 1927 when an Imperial Airways plane will fly from Croydon, England, to Cairo, and will open the service from that point on Jan. 12, by a flight over the desert to Bagdad and across the Persian Gulf to Karachi, in northern India.

For the first three months after that date, machines will leave Cairo for Basra, Persia, at fortnightly intervals, arranged to connect in Egypt with mail steamers from England. On April 6, when experience has been gained in operating the route, the last section from Basra to Karachi will be opened monthly, making a through route of just over 2,500 miles.

Passengers will embark at Heliopolis airdrome, Cairo, on Wednesday afternoon, reach Bagdad early Thursday afternoon, and, when the full route is open, will arrive at Karachi Saturday afternoon. The time spent on the complete journey will be a little more than three days, but the actual flying time only 31 hr, 45 min eastbound, and 30 hr., 35 min westbound. Rest houses are being provided at all stages where accommodation does not exist, and these will be staffed by the Imperial Airways to provide quick meal service during the day and comfortable sleeping quarters at night.

A new type of aircraft has been designed for this service by the De Havilland Aircraft Co., known as the D.H.66, Hercules. The planes are fitted with three Bristol Jupiter 400 hp. radial air-cooled engines, have a total weight of 14,800 lb., and are designed to fly with full load on two engines. They will take 12 passengers with baggage, and a certain amount of mail matter, and will carry one pilot, a mechanic-pilot, and a radio operator.

The Arrow Commercial Airplanes

A Two-Seater Sport Plane and a Five-Seater Commercial Machine

THE ARROW FIVE, manufactured by the Arrow Aircraft Corp. of Hevelock, Neb., is a five place semi-cabin commercial airplane. The machine is built especially rugged to take the hard usage of barnstorming and other commercial work. The seating arrangement takes care of four people in the passenger compartment, two riding forward and two backward, with the pilot slightly higher and in the rear of the passengers' compartment. The plane is powered with either a 180 hp. or 150 hp. Hispano Suiza engine.

The Fuselage

The fuselage is of box wall, plywood construction to the rear of the pilot's cockpit, with strut and diagonal bracing forming the internal bracing of the wall. This box wall is carried straight through to the front of the engine bed. This construction makes a very rigid and steady structure throughout. The nose is nicely streamlined with a hood over the engine that is entirely removable. The construction of the fuselage from the pilot's cockpit to the stern post is of conventional wood longeron and wire brace construction. The undercarriage is of steel construction with conventional design straight through axle and spreader bars.

The Wings

The Arrow Five wings are of the U.S.A. 35 wing section. They are rounded at the tips and both upper and lower are of the same span, being 40 ft. with 6 ft. chord. A 46 gal. gasoline tank is carried in the center section, and follows the contour of the wings, giving no appearance of the presence of a fuel tank. The interplane struts are single eye struts with steel adjustable heads having interplane bracing of 7-32 in. cable, double flying wires with single landing wires.

The Ailerons

Ailerons are fitted to all four wing tips and are operated from the cockpit by cable. The lower ailerons are operated through the lower wings by rabbits direct from the control column, while the upper ones employ a spreader tube. The stabilizer and elevators are blended into round tips conforming with the tips of the wings, while the rudder is balanced. The entire tail unit has ample surface to give the machine excellent control at low speeds.

General Details

The following are the dimensions and performance data, supplied by the manufacturers:

Span, both wings	40 ft.
Chord, both wings	6 ft.
Total wing area	432 sq. ft.
Length, overall	27 ft.
Height	8 ft.
Weight, full load	2850 lb.
Weight, empty	1900 lb.
Span of tail plane	13 ft.
Total area	50 sq. ft.
Performance fully loaded	
Wing loading	6.5 lb./sq. ft.
Power loading	19 lb./hp.
Speed, max.	94 m.p.h.
Speed, min.	45 m.p.h.
Climb at ground	531 ft./min.
Absolute ceiling	12,500 ft.
Service ceiling	10,250 ft.
Performance with pilot alone	
Wing loading	5.0 lb./sq. ft.
Power loading	14.3 lb./hp.
Speed, max.	100.8 m.p.h.
Speed, min.	37 m.p.h.
Climb at ground	820 ft./min.
Absolute ceiling	15,800 ft.
Service ceiling	17,240 ft.

The Arrow Sport

The Arrow Sport is a small two-place biplane, powered with a 30-35 hp. Anzani. It has a well streamlined fuselage seating two people comfortably side by side with dual controls. It is of full cantilever wing construction, having no struts except at the center section. The stabilizer is also a cantilever, making the plane the last word in freedom from parasite resistance.

The Arrow Sport was designed and constructed by the Arrow Aircraft Corp. for the purpose of filling a place in

The Arrow Five commercial airplane which carries four passengers and pilot (Hispano Suiza, 150 hp., or 180 hp.)

The Arrow Sport two seater (Anzani, 30-35 hp.)

aviation which has been a long time neglected, namely, the need for a small two-place machine with low initial cost with the cost of upkeep at a minimum, and within reach of any person wishing to own a small plane for pleasure

The Arrow Sport, after 10 hr. of flight test, has been found to be exceptionally stable, with a steadiness and freedom of vibration in the air that is excellent. The little plane has been put through every antic and stunt that has been possible for the test pilot to think of, with the exception of spinning, which it will not do readily. In a 35 m.p.h. wind, the Arrow Sport was found to be controlled as easily as in a dead calm. The plane has ample aileron and tail control.

Wing Section

The wings are of full cantilever construction, having no interplane bracing on either upper or lower wing. They are of the thick section type, tapering both in plan and profile. The lower wing is attached with four bolts, and recesses into the paving of the fuselage. The upper wing is supported by four center-section struts with wire bracing.

The Fuselage

The fuselage is of conventional design with wood longerons and wire girder construction. It has a fairing on the sides and bottom, giving the fuselage a circular section streamline form.

The undercarriage has a single strut on each side, with wire bracing, fore and aft, and an axle of normal type. The tail group involves no wires except controls. The horizontal stabilizer is of full cantilever construction. The rudder has a large balance portion, giving the rudder, which is operated by peddles, very free action.

The engine mounting is of steel plate construction and the Anzani engine is well cowled.

The Ailerons

The ailerons are of special note in view of the fact that they have the positive control through tubes direct to the cockpit. The machine has single ailerons only on the lower wings.

The following are the dimensions and the manufacturer's performance figures:

Span, both wings	25 ft.
Length overall	16¾ ft.
Height	7 ft.
Total wing surface	158 sq. ft.
Weight empty	425 lb.
Weight full load	850 lb.
Wing loading	4.8 lb./sq. ft.
Power loading	(35 hp.)—22 lb./hp.
Performance fully loaded (850 lb.)	
Speed max.	72.5 m.p.h.
Speed min.	35 m.p.h.
Climb at ground	405 ft./min.
Absolute ceiling	12 870 ft.
Service ceiling	8 950 ft.
Performance with pilot alone (635 lb.)	
Speed max.	80 m.p.h.
Speed min.	32 m.p.h.
Climb at ground	615 ft./min.
Absolute ceiling	18 500 ft.
Service ceiling	14 000 ft.

The Arrow Sport (Anzani, 30-35 hp.). Note the pure cantilever tapered wings.

T. Z. Fagan, Vice-Pres., of Scintilla

T. Z. Fagan, formerly sales engineer, has been elected vice-president of the Scintilla Magneto Co., Inc., of Sidney, N. Y. AVIATION extends its congratulations to Mr. Fagan on this deserved recognition of the excellent work he has done during the past few years in introducing Scintilla Aircraft Magnetos to the American aircraft industry and the Army and Navy. Formerly a Swiss product, these magnetos are now being produced in quantity by the American company of which Mr. Fagan is vice-president, to meet an increasing demand built upon performance, reliability and service.

Mr. Fagan's aviation experience began in April, 1917, when he joined the Aviation Unit at the Great Lakes Naval Station. Successively he became fleet engineer, submarine chaser fleet, senior instructor, aircraft engines, Packard Motor Car Co. and engine instruction book writer at Columbia University. Mr. Fagan left the Government service in March, 1919, to become sales engineer of the Fansteel Products Co. In October, 1922, he joined the Scintilla Magneto Co. as salesman of aircraft magnetos. His quick rise to the position of vice president of the company best suggests Mr. Fagan's character and ability.

Bureau of Standards Anniversary

A celebration of the twenty-fifth anniversary of the Bureau of Standards of the Department of Commerce is just announced. On Saturday, Dec. 4, next, the Bureau will keep Open House and a banquet will be given at which the many friends of the Bureau will meet the staff and reminiscences will be exchanged, the achievments of the quarter century will be reviewed, and the present and future work will be discussed. A group of distinguished guests will attend. The event is of interest to the world of science and, as well, to the industrial experts who have worked so closely in co-operation with the Bureau and in turn made application of its discoveries and developments in perfecting the measured control of processes. The opportunity to inspect the experimental research facilities of the Bureau will be welcomed by its many friends.

Progresa in Italian Air Transport

Rome is, perhaps, the only European capital which is not yet connected by air with any continental center. But with the rapid growth of the Italian commercial air service this lefieiency is to be remedied, and Rome will very soon become the terminus of a very important air line, linking Italy with Germany and central Europe. An Italian company, a section of the former Aero Lloyd, has just been formed for this purpose and has submitted to the authorities a plan for a regular air service between Rome, Milan and Munich. The distance from Rome to Milan, over 300 miles, can be covered in about 3½ hr., and that from Milan to Munich, which is about 190 miles, can be accomplished in something over 2 hr. The latter route will be over Lake Como and the Valtallina Valley to the Brenner Pass, and special airplanes of the quadruple engine type will be constructed capable of flying over the high Alpine Mountains, at an altitude of 13,000 ft. Rome will thus be connected to Munich, Berlin, Warsaw, Prague and Moscow, while the cities of central Europe will establish quicker communications with the Balkans and the Near East via Italy.

Spain-Argentina Zeppelin Line

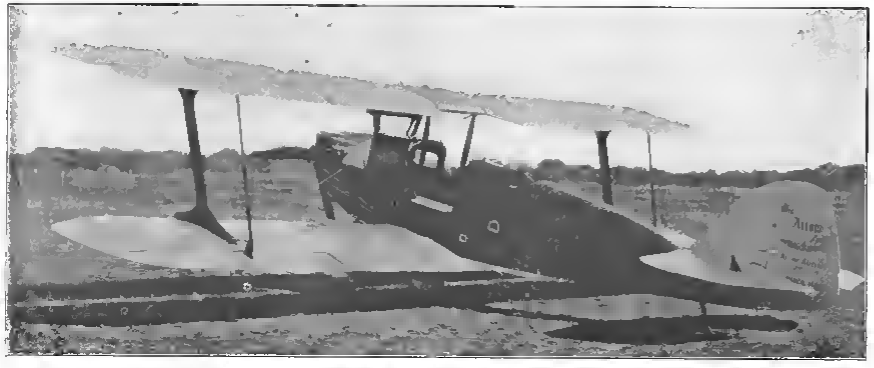
A concession for a Zeppelin airship line is reported to have been granted by the Government of Spain to a joint Spanish-German concern for air traffic between Seville and Buenos Aires.

It is reported that the Zeppelin concession is to run for three years. Within that time, regular communication must be established between Spain and Argentina or the concession will be annulled. It is planned to run under the Spanish flag, but the Zeppelins will be constructed by the Germans. The first airship to be put in operation is now being built at Friedrichshafen. This ship should be ready for use in the Fall of 1927 or the Spring of 1928. It is to be 50 per cent larger than the ZR III, Los Angeles, and is to have a capacity of 105,000 cu. meters.

The Spanish Government is reported to have guaranteed a subsidy of 6,000,000 pesetas a year for 5 years, as soon as operations commence. With a provisional schedule of 12 round trips per season, this means 500,000 pesetas per trip. The crossing from Seville to Buenos Aires is expected to take 4½ days, as contrasted to 20 or more by boat.

A New S. American Air Line

A new commercial air line is to be established in Peru between Iquitos and the central part of the country. The new service will be used to map the Upper Amazon Territory as well as to transport mail and passengers. Considerable time will be saved as the trip can now only be made by mule-back and canoe requiring some twenty days while the flight can be made within a few hours. An item of 45,000 Peruvian pounds will be included in the general budget for 1927 to defray the expenses of this service.



Another view of the Arrow Five commercial plane (Hispano-Suiza 150 hp. or 180 hp.)

Side Slips

By Robert R. Osborn

Noting that Philadelphia, Los Angeles County, California and several other communities are establishing aerial police forces, H H F. Jr. writes in to describe a similar police force he saw portrayed in the movies about a year ago. It seems that the bandits were attempting to escape in the open country with the booty and the beauty whom they were spied by the formation of police planes. This formation maneuvered into position and a determined deputy sheriff jumped out of each plane with a parachute. Then they were pictured landing simultaneously and serenely, with drawn revolvers, in a perfect circle around the dumfounded bandits. This certainly must have made an exciting picture and furnishes a mark of efficiency and dispatch for these newly formed police departments to shoot at. We do think the scenario could have been improved, however. For instance, if it had been the Pennsylvania State Constabulary or the Northwest Mounted Police involved in the capture, one undersized constable would have been assigned to make the jump. He wouldn't have bothered to pull his gun either—he would have maneuvered his 'chute so as to go right into the fleeing automobile, whereupon each scared bandit would hold up his wrists for the handcuffs.

* * * *

From our observations extending over a period of quite a few years, we have reached the conclusion that no one can claim to be anything but a second-rate airplane pilot until he has mastered the technique of taxiing up to the crowd at the field, jumping gracefully out of the cockpit, and demanding a cigarette from the nearest awe-struck spectator. There are lots of good fliers in the country, but only the ones who have actually "arrived" can put over this cigarette-borrowing flourish.

We are not yet sure that we have the situation completely in hand, but at least we can report progress. Two weeks have passed now, without anyone claiming to have delivered an electric stove by airplane for the first time in history.

* * * *

It seems that the airplane manufacturers have been working along all of these years with the wrong ideas altogether. At a banquet the other night one of the speakers said that commercial aviation will never be a success until "cheap airplanes will be spread over the land." Most of the designers with whom we are acquainted have been trying pretty hard to keep their creations from being "spread over the land."

Aircraft Exports

The Bureau of Foreign and Domestic Commerce reports that domestic exports of aircraft and engines, from the United States, during the month of August, were as follows:

Countries	Engines for aircraft Number	Engines for aircraft Dollars	Airplanes, seaplanes and other aircraft Number	Airplanes, seaplanes and other aircraft Dollars	Parts, except tires Dollars
Germany	–	—	–	—	1 068
Italy	–	—	–	—	500
Norway	–	—	–	—	253
United Kingdom	13	80,207	–	—	1,040
Canada	–	—	–	—	807
Nicaragua	–	—	–	—	781
Panama	–	—	–	—	30
Mexico	–	—	1	9 950	100
Cuba	–	—	–	—	489
Argentina	–	—	1	4,705	847
Brazil	–	—	–	—	85
Colombia	–	—	–	—	1 275
Peru	–	—	–	—	1,300
Venezuela	–	—	1	5,928	—
Philippine Islands	–	—	–	—	160
Australia	3	1,640	–	—	—
New Zealand	–	—	–	—	51
British S Africa	–	—	–	—	33
Total	18	84 847	3	13,183	8,430

N.A.T. Contracts With American Express

New Plan National in Scope.

THE AMERICAN Express Company has taken the first step in a move to transport the company's shipments by air in the signing of a contract with the National Air Transport, Inc., to carry its packages between New York and Chicago and Chicago and Dallas, Robert E. M. Cowin, president of the company, announced recently. One full business day will be saved between New York and Chicago and Chicago and Dallas.

It is planned to transport the packages at night as well as by day, one plane leaving New York for Chicago, another Chicago for New York, still another leaving Chicago for Dallas and the fourth one leaving Dallas for Chicago.

Expansion Planned

Later it is hoped that the service can be extended to San Francisco. Feeder lines, such as Boston to New York, Philadelphia to New York, and others will be established, it is expected later in the Spring. The planes will carry small non bulky packages. The lease with the National Air Transport Company also shows that company to carry United States mail.

The Associated Press, in its detailed account of the new service, says:

Augmenting the present railway express system, the air service is scheduled to be in full operation on or before April 15, next year.

"The demand of American commerce for the quickest possible transportation service at all times," Mr. Cowin said, "is responsible for the innovation."

The establishment of the new service represents the linking of the airway express organizations of the country and one of the largest private capital air transport corporations in the world.

Functions Separated

The Express Company will function in the pickup and local delivery of express packages, and the plane transport organization will do the carrying.

By air service, the Express Company expects to save one full business day in the delivery of express matter, of the size and weight suitable for air transportation, between New York and Chicago and the latter city and Dallas.

In confirming the signing of the contracts, Howard E. Coffin, president of the National Air Transportation, Inc., announced the culmination of negotiations in process since March, 1925, when the transport organization was first projected.

He recalled that in May, 1925, the company had announced that among its principal objectives was the institution of an express service between New York and Chicago, and later of one from Chicago to Dallas.

"The signing of these contracts," he said, "thus marks the culmination of many months of experiment, of organization and of co-operative effort to this end.

Commercial Policy Aided

"It marks also a long step forward in the firm establishment of that privately owned and operated commercial air transport which is the professed object of all the air legislation which has been enacted in Washington in 1926, and which has become a matter of deep rooted national policy.

"This group of representative Americans (National Air Transport, Inc.) of whom I have the honor to be president, has gone forward courageously and unitedly in the prosecution of its original object, although the group was drawn from many parts of the territory which it aimed to serve. It has operated entirely on its own capital. No stock has been sold to the public, nor is there any such intention. The policy of the company is to give a full, fair and thorough trial to transportation by air.

"On May 1 this year, the first link of the system was inaugurated, carrying the air mail between Chicago and Dallas. The record of this line has been very satisfactory to us. It has flown approximately 350,000 miles without an accident. It has completed 98½ per cent of its scheduled mileage. It has maintained its time schedules at 92 per cent. It has lost no mail and injured no people. It has had only one mechanical forced landing for each 85,000 miles of flying and its total damage to its aircraft through such forced landings has been less than $600."

Officers

Among the officers of the transport company are the two respective heads of the two pioneer air companies of America, C. M. Keys, president of the Curtiss Aeroplane & Motor Company, and Charles L. Lawrance, president of the Wright Aeronautical Corporation.

Other present officers are, besides President Coffin, Wayne C. Taylor, of Chicago, and Eugene W. Lewis, of Detroit, vice-presidents; John J. Mitchell, of Chicago, treasurer; Carl B. Fritsche, of Detroit, secretary, and Chester W. Cuthell, New York, counsel.

Among the directors or stockholders, no individual among whom under the by-laws may own or control more than 5 per cent of the capital, are the following: Trowbridge Callaway, Leonard Kennedy, Jeremiah Milbank, Clarence Dillon, Stuyvesant Fish, William A. Rockefeller, Sherman Fairchild, Glenn H. Curtiss and Richard F. Hoyt of New York.

From Chicago are Charles E. Glore, Lester Armour, Philip K. Wrigley, Robert P. Lamont, Earle H. Reynolds, Marshall Field and C. Balthus.

From Detroit, Walter O. Briggs, Harold H. Emmons, George M. Holley, C. F. Ketterng, William E. Metzger, Fred J. Fisher and William B. Mayo.

From other points: John Hays Hammond, of Washington, D. C., W. J. Austin, Cleveland; Harold F. Talbot, Jr., Dayton; Harold F. Pitcairn, Philadelphia and C. P. Lodington, Philadelphia.

Flight From Australia to Samoa Planned

It is reported that the Royal Australian Air Force has arranged for a flight from Australia to Samoa by way of New Guinea, the Solomon Islands, New Hebrides, New Calendonia, and Fiji, to be commenced soon. The pilot will be Group Captain Williams, Chief of the Australian Air Force, who will be accompanied by a mechanic with experience as a pilot, and a radio operator, who will also operate a camera.

The machine to be used is a DH-50 fitted with floats and a Siddeley-Puma engine of 240 hp.

It is proposed that the route followed will be from Melbourne, up the East Coast of Australia, to Thursday Island, thence round the Southeast coast of New Guinea, and along the northeastern coast as far as Madang. From Madang, the machine will proceed round the southern coast of New Britain to Rabaul, and thence to the Solomon Islands, Santa Cruz Islands, New Hebrides, New Calendonia and Fiji. From Fiji it is possible that the machine will visit the Friendly Islands and the Samoan group.

It is stated that the main object of the flight is for the purpose of reconnoitering the Mandated Territories and the islands of the Southern Pacific from the air, and obtaining data as to the suitability of the climatic conditions generally for flying operations.

AIRPORTS AND AIRWAYS

Kansas City, Mo.

By Terence Vincent

The Kansas City Aeronautical Association continues to stir up general interest in aviation over the city and vicinity. Whether or not Richards Field will become permanently the property of Kansas City aviation interests, continues problematical. The K.C.A.A. is disposed to take it over for a five year period, provided the lease includes an "option to purchase" clause, effective at the expiration of the lease or before, upon proper payment. The reluctance of the lessors to include that clause is said to hold up negotiations, and, therefore, other locations than Richards Field are being surveyed by various aeronautic interests with a view to lease or purchase.

Dr. George L. Bennett continues to have good sized crowds there at week-end parties, aided by the K.C.A.A.

The Sweeney School recently announced a course of instruction on Saturday mornings for model airplane builders.

Lon Holland, president of the local Chamber of Commerce has attended nearly a dozen aeronautic meetings in the past few weeks, boosting the flying game in general, and the permanent landing field proposition in particular.

Denver, Colo.

By M. J. Mcloaney

The arrival at Denver of the North Pole Fokker on its tour of the country was given much front page publicity locally, rousing the interest of the public to such an extent that when the famous plane dipped into Lowry Field an enormous crowd of flying enthusiasts greeted its pilot and passengers.

Denver is rapidly becoming airminded. The Chamber of Commerce is working enthusiastically on plans for a thoroughly modern municipal landing field. At Lowry, Colo., airways field lighting units are being installed which will place Denver on par with the majority of the airports of the country. The Alexander Aircraft Company is completing negotiations for the purchase of 120 acres of flat land on the outskirts of the city for a new Alexander Airport. Here they will erect a hangar for their own and visiting planes. This will give Denver three well equipped airports and increase interest in the winter flying, which is most practical in this high and dry part of the country.

L. C. Miller, piloting an Alexander plane is on his way East and will pilot for the southeastern divisional sales manager, L. F. Schaoer, of the Alexander Film Company, during the winter months. Willis Kyser will act in the same capacity for George May in the New England district.

Virginia Aids Aviation

The Virginia State Chamber of Commerce at a recent meeting adopted a resolution urging the Virginia General Assembly to pass such legislation as may be necessary to authorize cities, towns and counties of the state to acquire by purchase, or otherwise, suitable property to be developed, maintained and used as landing fields and airports.

Bettis Field Dedicated

On Nov. 15 the airport heretofore known as the Pittsburgh-McKeesport Airport, near Drevosburg, was named Bettis Field, in honor of Cyrus K. Bettis, late Army pilot. Assistant Secretary of Commerce for Aeronautics William P. MacCracken, Jr., was the principal speaker at the ceremony.

Detroit, Mich.

A committee from Detroit and Wayne County, Mich., headed by Solon E. Rose, engineer adviser for the Mayor of Detroit, on Oct. 28 interviewed War Department officials to obtain technical advice on an airport for Michigan.

Officials of the city have proposed for this purpose Grosse Island, located just east of the head of Grasse Isle, and between Fighting Island and the American mainland. The airport, as planned, will comprise 600 acres. It is eight miles from the center of Detroit.

Beaumont, Tex.

The landing field at Beaumont, Tex., which is situated on the West side of the city, is approximately one-half mile square, and has runways to the Northeast and Southwest. It can be easily distinguished from the air, the name of the city being written on one of the buildings in 6 ft. letters. The building is equipped with a wind cone. The city invites all fliers to use this field.

A.S.P.A. Will Interest Boy Scouts

The American Society for Promotion of Aviation, 522 Fifth Ave., New York City, desires to hear from former war pilots, commercial fliers, or men qualified to instruct boys in the fundamentals of aviation. The Society is planning an educational campaign among boys and would like to have the names of men of flying training who would be willing to give one night a month to talks before Boy Scout troops in their communities.

Boston, Mass.

By Daniel Rochford

The first suspension of a commercial pilot's license, under the Massachusetts air code, took place Nov. 5, when Registrar of Motor Vehicles Frenk Goodwin suspended the license of Adolph Backstrum, who had been guilty of flying low over the football crowds leaving the Harvard Stadium, Saturday afternoon in a lighted plane advertising stunt.

Beacon at Boston, Mass.

The first beacon light in Boston was put in operation recently on the roof of the Gilchrist store. Porter Adams, president of the National Aeronautic Association, officiated. Pilots Frank Crowley and Benjamin F. Billings made night flights on the occasion. Mayor Malcolm E. Nichols of Boston turned on the power.

Service flying from Boston last week totalled 21 hr. for the Army, 42 hr. for the Navy and 17 hr. for the National Guard.

The Boston Airport Corporation has nineteen pupils enrolled in its flying course, a record number for this season of the year.

The Colonial Air Transport, Inc., has temporarily shut down its Boston traffic offices and is handling its business at its offices in the Boston Airport.

Considerable interest in European flying conditions was evinced at the recent visit of Major Lester D. Gardner to the M.I.T. His talk was followed by questions about details of the various lines and their equipment.

St. Joseph, Mo.

The Josephine Ford arrived in St. Joseph Oct. 25, landing on Rosecrans Air Field and remaining on exhibition until Oct. 26, when it left for Omaha. At a luncheon to the crew at the Robidoux, Pilot Bennett briefly recounted the story of the trip to the North Pole, stressing its importance to the development of aviation. Charles F. Kunkel, personal representative of Harry F. Guggenheim, president of the Guggenheim Fund for the Promotion of Aviation, followed Bennett with a talk on the objects of the Guggenheim fund and local aviation conditions. He found general interest keen on the subject and said that the municipality had, through its citizens, spent $272,000 in promoting aviation. Although St. Joseph has an outstanding place in aviation, Mr. Kunkle said that the people should not be content with their air program. The city is now in a position to attract aviation as a center of traffic and also factories for the manufacture of airplanes, and it should continue to enlarge its program.

Mayor Stigall officially welcomed the crew, the committee including representatives of various civic organizations, Carl H. Wolfley, vice-president of the National Aeronautic Association, Harry Block, governor of the organization for Missouri, and A. R. McGinnis, president of the St. Joseph chapter.

From Omaha the airship went to Denver, from which city it left for a tour of the Pacific Coast before returning to Washington, which it will reach by Dec. 1.

Secretary of War Davis visited St. Joseph Oct. 26 and upon his arrival was taken to Rosecrans Field. Four planes from the Seventh Army Corps headquarters at Omaha arrived during the afternoon and performed over the city. Secretary Davis said that St. Joseph had impressed him with the progress it had made in aviation and he hoped to see an Army unit stationed here.

United States Air Forces

Navy Boeing Fighter Does 186 m.p.h.

The FB airplane which Lieutenant Cuddihy piloted to victory in the open fighting plane race at Philadelphia, Sept. 11, was flown over the measured speed course at Anacostia after its return from Philadelphia. On the triangular 12-mile race course Lieutenant Cuddihy averaged nearly 180.5 m.p.h. Over the measured course the plane showed a high speed of 186.5 m.p.h. This performance is a credit to the skillful piloting of Lieutenant Cuddihy and to the Packard Model 2A-1500 engine, which equips the FB-3. This particular engine, with a compression volume ratio 7.65 to 1, develops approximately 600 hp. at 2350 r.p.m. and the entire power plant has functioned in a most satisfactory manner.

Fog Dispelling Tests

Lieut. De Long Mills, U.S.N., of VT Squadron One, recently conducted two fog dispelling tests at Hartford, Conn. The first test was made when a cloud at 3,600 ft. altitude, cubical in shape, about 800 ft. on a side, was attacked. One trip was made over the top center of the cloud and the sand cut the cloud in half. A second trip over the cloud caused it to vanish completely.

A large cloud directly over the city was attacked next day at about 1,300 ft. The plane entered the cloud at about 1,200 ft. altitude. As the cloud was larger and thicker than the pilot anticipated, he decided to turn about and get out to avoid any embarrassing complications. To his surprise, on turning around it was discovered that the plane had cut a wind path in the cloud which enabled him to return to open air without any mishap.

Aircraft Squadrons, Asiatic Fleet

Two planes with the Commander Aircraft Squadrons, Asiatic Fleet on board, flew recently to Port Santa Marie, a small unfrequented port about 60 miles north of Zamboanga, P. I., on the West coast of Mindanao. The purpose of the flight was to inspect the port as well as a teak forest in that vicinity. Several photographs were taken. The teak forest is perhaps the only one of its kind in the Islands, having been planted supposedly by the early Spaniards. The present owners are endeavoring to sell this teak for the use of the Navy and inspections were made from the ground and from the air

Navy Enlisted Men's Flight Course at Pensacola

Applications from enlisted personnel of the Navy for the flight training course at Pensacola have been so numerous that the Navy Department has been compelled to call the attention of the service again to the fact that only enlisted men of chief petty officer caliber will be considered.

Naval medical officers acting as flight surgeons claim that practically every man under twenty-eight years of age, from mess cooks to yeomen, on naval ships and stations have been applying for the course, which graduates men as aviation pilots. The medical examination for aviation includes a thorough physical and psychological test, which lasts about three hours. Flight surgeons have been so overwhelmed with applications that it is estimated unofficially, if the Navy Department had not limited applications to those of chief petty officer caliber, tests of present applicants would not be completed for two years.

The next enlisted men's course in flight training at Pensacola will be assembled Jan. 4, 1927 and will number twenty-five men.

Dedication of Lansdowne Field

Admiral William A. Moffett, U.S.N., Chief of the Bureau of Aeronautics, on Saturday, Oct. 16, dedicated a field at Youngstown, Ohio, in memory of Commander Zachary Lansdowne, of the ill-fated Shenandoah

Admiral Moffett was a passenger on the Los Angeles on the recent trip to Detroit and left the ship at that city to proceed by train to Youngstown for the purpose of dedicating the field which will be a commercial enterprise. After the formal dedication, Admiral Moffett went by train to Washington

Aircraft Squadrons, Battle Fleet

There has been much activity in VO Squadron Two, which based at San Diego during the Summer, preparatory to going to San Pedro. Planes and equipment have been transferred to the Battleship Divisions and flotation gear installed on all the planes. The planes were flown to San Pedro and the personnel and equipment transported on the Arcostook. After the long sojourn at San Diego, the majority of the personnel were experienced in aviation aboard battleships, and a few days were necessary to accustom it to the new duties. During the three months' concentration period at San Diego, numerous tactical problems were successfully solved with VO Squadron One and VF Squadron Two. After its arrival at San Pedro, the Squadron held gunnery practice preliminary to the firing of individual battle practice.

Training is being held for enlisted men, naval aviation pilots, of VF Squadron Two, as well as individual battle practice.

Planes used by moving picture photographers to photograph simulated bombing attack on a camouflaged transport were furnished by VT Squadron Two. The Squadron has also started checking the corrosion condition of SC planes used on the West Coast, and which have seen considerable service

Naval Air Station, Pearl Harbor, T. H.

Flights were recently made around the Islands of Oahu and Molokai by VP Squadron 14. The planes used were two F-5-L seaplanes and the object of the flights was for the purpose of pigeon training and the taking of aerial photographs of emergency seaplane landing areas. Practice in torpedo approaches with SC type planes has been the activity of late of VT Squadron 19.

Tests by Lieut. M. T. Seligman and Lieut. E. C. Peterson have been made on the SC-2 torpedo plane. This plane performed in an excellent fashion throughout the tests, particularly in taking off with full load and in climbing characteristics. The maximum speed reached with a full load of 9,533 lb. was 108 m.p.h. This load is 181 lb. heavier than the required dead load, and the speed is 7.9 m.p.h. greater than that on former tests. Such performance in an operating plane, not especially overhauled or otherwise repaired for testing purposes, is considered remarkable. The climb to a service ceiling of 5,000 ft. in 39 min., carrying a dead load of 9,533 lb., and a useful load of 3,596 lb., is considered an excellent performance. The rapid take-off, even in a light wind, is a feature which makes this plane excellent for torpedo and bombing work in that vicinity. The instruments used in checking these performances were the regular equipment of the plane and therefore cannot be considered as strictly accurate.

Army Air Orders

Col. Overton Curtis Pierce, Air Corps Res., Washington to active duty Mitchel Field reverting to inactive status Nov. 30.

Capt. Harry H. Young, Air Corps, Langley Field, to Omaha, Neb.

Capt. Byrne V. Baucom, Air Corps, relieved from assignment and duty in office of Chief of Air Corps, and will report to com. off. Bolling Field

Sec. Lieut. Martin William Duffy, Air Corps Res., Cedar Rapids, Iowa, to Chicago, Ill.

Sec. Lieut. Elmer Edward Zimmer, Air Corps Res., Buffalo, to active duty with Air Corps procurement planning representative, Buffalo, for training, reverting to inactive status Nov. 21

Maj. Raymond Warren Kearney, Air Corps Res., Alameda, to San Francisco, reverting to inactive status Nov. 22

First Lieut. Bernard Michael Doolin, Air Corps Res., San Francisco, to active duty with chief procurement planning office, San Francisco, reverting to inactive status Nov. 22

The resignation by Capt. Ivan Banson Snell, Air Corps, of his commission as an officer of the Army, accepted.

Capt. Leo James Griffin, Air Corps Res., Atlantic, Mass., to active duty Langley Field, reverting to inactive status Nov. 21.

Navy Air Orders

Lieut. Comdr. Campbell D. Edgar det. Nav. Air Sta., Pensacola, to USS New York

Lieut. Alford J. Williams det. Nav. Air Sta., Anacostia, to Bu. Aero.

Lieut. Ralph F. Davison det. com. V.S., Sqd. 2, Aircraft Sqdns., Battle Flt., to USS Langley.

Ensign Robert O. Munter det. Nav. Air Sta., Pensacola, to USS Hannibal.

Lieut. Caleb Whitford det. Nav. Aircraft Fact., Navy Yard, Phila., to Inspr., Nav. Aircraft, Loening Aeron. Eng. Corp., New York City.

Lieut. (jg) Stewart Lindsay det. Nav. Air Sta., Pensacola, to Off. Nav. Commun., Navy Dept.

Comdr. Willis W. Bradley, Jr., det. Rec. Bks., Hampton Roads, to N.A.S., Pensacola

Lieut. Comdr. T. N. Alford det. command USS Kennedy, to temp. duty N.A.S., Pensacola

Lieut. Harold J. Brow det. N.A.S., Pensacola, to N.A.S., N.O.B., Hampton Roads.

Lieut. Charles M. Johnson det. N.A.S., Rockaway Beach, N.Y., to USS Bridge.

Lieut. Comdr. Ralph E. Dennett det. off. Nav. Oper., Navy Dept., to temp. duty N.A.S., Pensacola

Lieut. Roland G. Mayer det. N.A.S., Lakehurst, to USS Los Angeles.

Comdr. Richmond K. Turner det. Bu. Ord., to temp. duty N.A.S. Pensacola

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LIBERTY, Renault, Mercedes, Aeromarine, OX, OXX motors, new metal tipped propellers, all types, metal tipped pushers for iceboats $15, new complete air driven gas pumps $10. Aeromarine floats, M F spares, control wires, with turnbuckle end. Essington School of Aviation, Essington, Pa.

AIRCRAFT BARGAINS: Dope, fresh, $2.00 gallon. Tape 4c yard. Linen 75c yard. OX5 jet wrenches 35c. OX5 spark plugs 25c. 14' ash longerons $3.00. 10" needles 25c. Rib cord, pound ball, $3.00. We recover surfaces completely. Also overhaul motors. Wanted: Used, serviceable, OX and Anzani motors. Ostergaard Aircraft, 4269 North Narragansett, Chicago, Ill.

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The New Curtiss "FALCON"

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